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GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

August 20, 2009

Mr. William Ryan
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (SR-6J)
Chicago, Illinois 60604

Dear Mr. Ryan:

SUBJECT: G&H Landfill Superfund Site, Review of January – July 2008 Report

The Michigan Department of Environmental Quality (MDEQ) has received and reviewed the Operation and Maintenance Semi Annual/Annual Progress Reports (January – June 2008) submitted by Conestoga-Rovers & Associates (CRA) on behalf of the G&H Landfill Potentially Responsible Party Group. The MDEQ has provided a comprehensive review of this report utilizing site operation, maintenance, and performance requirements stated in the Scope of Work (SOW) attached as Appendix 4 to the United States of America v. Browning-Ferris Industries, Inc., et al. Consent Decree, dated June 30, 1993, and the Operation and Maintenance Plan (OMP) Containment System, Site Cap, Wetlands Mitigation, G&H Landfill Site, Macomb County, Michigan prepared by CRA, dated March 2000. The objective of this detailed review is to highlight comments and concerns that will likely be brought to your attention in the upcoming 2011 Five-Year Review process and allow an opportunity for progress prior to the Five-Year Review.

Additionally, the MDEQ visited the site on April 16 and 27, 2009, to introduce new staff to the site, observe current site conditions, and meet the CRA project team. Observations from the site visits are also summarized within this letter.

General Comments on the Report

The delivery of reports, as indicated in the OMP (Section 5.1.6.3, Reporting) should be within 30 days of the final analytical data report from the laboratory. The January – June 2008 report was received on February 4, 2009. It appears reports are not being submitted in a timely manner.

The internal cover page of this report is incorrectly dated November 2009.

Section 5.1.6.3, Reporting, of the OMP includes the following requirements that do not appear to be addressed in the report:

- Calculation of hydraulic gradients for pipe and media drain well pairs tabulated to determine whether hydraulic gradients are directed toward the pipe and media drains. The 2008 reports did not include any calculations for the well pair(s) associated with the Phase III landfill cell;
- Discussion of the evaluation of effectiveness of the groundwater monitoring program;

- Description of the site system maintenance activities for the leachate/groundwater collection systems at all landfill cells and any encountered problems that required corrective action;
- Evaluation of the effectiveness of the collection system, including tables and figures generated; and
- Recommendations for program revisions.

3.2 Groundwater Quality Monitoring

It was not indicated in the report how wells were selected for the five-year sampling event that was required pursuant to Section II.G.5 of the SOW.

3.3.1.1 Containment System Performance Monitoring

Barrier Wall Performance Monitoring

CRA reports that an inward gradient was maintained along most of the barrier wall with a slight outward gradient at well pair GH-58/59 and that downgradient sampling at GH-59 demonstrates stable chemical concentrations. The performance requirement for the barrier wall and associated collection system, as indicated in the SOW (II.B) is to "provide an inward 2.0 feet hydraulic gradient across the trench (i.e., the hydraulic head of the water table outside of the downgradient barrier shall be a minimum 2.0 feet higher than the hydraulic head of the water table on the inside of the downgradient barrier)." This performance requirement was met at 3 of 8 and 1 of 8 monitoring locations in March and June, respectively. Additionally, 1 location during the June monitoring event demonstrated an outward gradient (GH-58/59).

The inward gradient achieved across the slurry wall, during the past 8 years of operation, was evaluated by the MDEQ by comparing the inward gradient achieved (expressed in feet) over time at the internal/external monitoring well pairs along the slurry wall. Results of that evaluation are attached to this letter (Attachment A, Charts 1 - 8). The charts illustrate that the 2.0 feet inward gradient:

- Has been achieved and maintained at the GH-56/57 pair;
- Has been initially achieved and maintained, but has been lost in recent years at pairs GH-60/61, GH-80/81, and GH-82/83; and
- Has rarely been achieved at pairs GH-52/53, GH-54/55, GH-58/59, and GH-78/79.

Charts 1 through 8 also show that an outward gradient occurred frequently at pair GH-52/53 and occurred at pair GH-58/59 for most of 2007.

CRA reports water levels inside the barrier wall have remained stable. Water level trend charts, prepared by the MDEQ, are attached (Attachment B, Charts 9 - 16) for monitoring wells GH-52, GH-54, GH-56, GH-58, GH-60, GH-78, GH-80, and GH-82. The charts show water levels over time compared to the collection pipe invert elevations of the barrier wall collection system. The barrier wall collection system consists of a 6-inch high-density polyethylene (HDPE) leachate collection pipe and a 4-inch HDPE pipe, constructed approximately 10 feet above the 6-inch leachate collection pipe, to collect non-aqueous phase liquids (NAPL). The following observations are illustrated from the water level trend charts:

- Water levels have fluctuated approximately 2-3 feet seasonally within the capped cells with increasing trends observed at GH-52, GH-54, and GH-60 throughout the past 8 years of operation;
- Water levels have significantly exceeded the collection pipe inverts of the collection system throughout the past 8 years of operation;
- June 23, 2008, water levels at monitoring wells inside of the slurry wall range from 11.5 feet at GH-5 to nearly 16 feet at GH-80 above the invert¹ of the 6-inch HDPE leachate collection pipe; and
- June 23, 2008, water levels ranged from 3.75 feet at GH-78 to over 6 feet at GH-60 above the invert of the 4-inch HDPE NAPL collection pipe.

The OMP also states that successful hydraulic containment would be demonstrated by decreasing chemical concentrations in groundwater wells immediately downgradient of the barrier wall. Eight years of monitoring data indicate that concentrations of most chemicals have remained stable with arsenic concentrations increasing or fluctuating. Concentrations of most chemicals have not demonstrated a decreasing trend.

In summary, hydraulic and chemical data reviewed in this report do not present successful performance of the barrier wall and collection system at many monitoring locations. Additionally, the water level observed above the NAPL collection piping eliminates the ability of the collection system to retrieve NAPL.

Groundwater Monitoring of the West End of the Barrier Wall

The OMP states performance will be evaluated by determination of achieved flow to the east at well pairs GH-67/68 and flow to the north at well pairs GH-51/50, GH-67/66, and GH-68/66. During the March and June 2008 monitoring events, flow at GH-67/68 appears to be to the southwest and flow at GH-51/50, GH-67/66, and GH-68/66 appears to be to the west. As stated in the report, groundwater is not hydraulically contained at the west end of the barrier wall. The report also states that "data does indicate that the groundwater is not flowing around the west end of the barrier wall." Based on comparing the performance evaluation standards of the OMP to the March and June monitoring data, performance standards are not being met at the west end of the barrier wall.

Groundwater monitoring at wells GH-05A, GH-50, GH-51, GH-66, GH-67, GH-68, and GH-69 is referenced in the OMP to provide additional assurance of hydraulic capture by contaminant of concern concentrations not increasing over time. The observed persistence of benzene and cis-1,2-dichloroethene in all the designated monitoring wells that were sampled, in addition to the increasing arsenic trends observed at some of the wells, may indicate a steady source of contamination to the groundwater. Additionally, monitoring well GH-05A was not sampled as a part of the five-year sampling event. The report does not provide rationale for excluding GH-05A from the sampling event.

This data further supports that hydraulic containment, a substantive performance requirement of the remedy selected for the site, at the west end of the barrier wall is not being achieved.

¹Invert elevations were referenced from the Site Improvements-Partial As-Built Drawings prepared by Heritage Environmental Services, LLC dated November 29, 1999.

Detroit Water and Sewerage Department (DWSD) Watermain

The OMP indicates the collection system adjacent to the DWSD watermain will be operated to maintain the invert of the watermain in a dewatered condition. Additionally stated in the SOW, "The well(s) shall be operated and maintained to continuously prevent the groundwater table or landfill contaminants from contacting the watermain." The MDEQ evaluated the elevation of leachate in monitoring wells adjacent to the DWSD watermain against the average invert elevations of the water. As shown on Chart 17 (Attachment B), the collection system has not met this requirement. One exception was noted for the October 2002 to February 2003 period where a leachate elevation was recorded to be below the invert elevation of the watermain at 1 of 5 monitoring locations (GH-75).

CRA has reported for a number of years that DWSD intends to abandon the section of watermain at the site. However, CRA has not provided specific details and time frames for abandonment. Therefore, the performance objectives related to the watermain still need to be achieved. Additional support for achievement of performance objectives is summarized in the SOW (IIB) as, "A minimum of one extraction well located in the DWSD easement...to intercept landfill contaminants which may migrate in the bedding materials from the watermain...."

Phase III Leachate Collection System Performance Monitoring

A summary and evaluation of the performance of the Phase III leachate collection system as a hydraulic containment system has not been included in this report.

The OMP indicates that the pipe and media drain located along the west side of Phase III is designed to dewater the Phase III slope and intercept groundwater/leachate to prevent off-site migration. Additionally, the OMP indicates the pipe and media drain will be operated to maintain a dewatered condition. The MDEQ evaluated the water levels measured at GH-48, GH-49, and GW-10 over time with the toe drain collection pipe invert¹ elevation of the 6-inch HDPE collection pipe. The following is shown on Charts 18 and 19 (Attachment B):

- Water levels have significantly exceeded the toe drain collection pipe invert of the collection system throughout the past 8 years of operation; and
- June 23, 2008, water levels ranged from 4.27 feet at GW-10 to 5.44 feet at GH-49 above the toe drain collection pipe invert.

As indicated from Charts 18 and 19, the Phase III collection system has not achieved the performance objective of a dewatered condition and likely is not providing hydraulic containment of the leachate and contaminated groundwater migrating from Phase III.

In summary, regarding the containment system for Phases I, II, III, and the DWSD watermain, the SOW (IIB, B) states, "Settling Defendants shall design, construct, and operate and maintain a source containment system which shall hydraulically and physically isolate the Phase I, II, and III landfill areas." It also states the following: "Should groundwater level measurements show that the source containment system is not maintaining hydraulic and/or physical containment of the Site, EPA [Environmental Protection Agency], in consultation with the MDNR [Michigan Department of Natural Resources], shall request Settling Defendants to provide a plan for corrective action." and "Upon approval of the corrective action plan, Settling Defendants shall implement the plan in accordance with the schedule set forth in the approved plan." (IIB, B7, Correction of Deficiencies). As illustrated by the analysis provided herein, a request for a corrective action plan is indicated.

3.3.2.1 5-Year Groundwater Sampling Event

The SOW (IIG, 5) indicates that compounds found to be above the maximum contaminant levels (MCLs), non-zero maximum contaminant level goals (MCLGs), or cleanup standards derived under Michigan's former Act 307², Type B Criteria shall be added to the list of groundwater cleanup standards for the site with the cleanup standard being the more stringent of the MCLs or the Michigan's former Act 307, Type B Criteria. Additionally, the SOW indicates that compounds exceeding a lifetime cancer risk of 10^{-6} or a hazard index value of 1.0 shall be added to the list of groundwater cleanup standards for the site with the cleanup standard established at the level representing a 10^{-6} cancer risk or a 1.0 hazard index value, provided that the cleanup standard established exceeds the natural background concentration of the contaminant.

CRA summarizes that 11 compounds exceed the lifetime cancer risk of 10^{-6} and 12 compounds exceeded the non-cancer hazard quotient of 1.0. Of these compounds, 3 (benzene, vinyl chloride, and arsenic) currently have assigned cleanup standards. Also noted was that arsenic and aroclor-1254 exceed both the lifetime cancer risk of 10^{-6} and the non-cancer hazard quotient of 1.0. The remaining compounds are discussed below.

CRA concludes that no constituents are proposed to be added to the list of groundwater cleanup standards for the site; however, 15 compounds exceed their established MCL value and/or Michigan's former Act 307, Type B Criteria and an additional 5 compounds, not already identified in the 15 compounds exceeding criteria, exceed a lifetime cancer risk of 10^{-6} or a hazard index value of 1.0. These compounds are the following:

1,2-dichloroethane	Aluminum
1,4-dichlorobenzene	Antimony
Bis(2-chloroethyl)ether	Iron
Bis(2-ethylhexyl)phthalate	Manganese
Aroclor-1254	Nickel
Alpha-BHC	Sodium
Beta-BHC	Thallium
Delta-BHC	Zinc
4-methylphenol	Cyanide
Phenol	Sulfate

Groundwater detections from the June 23, 2008, sampling event, federal and state cleanup criteria, and summary of compounds exceeding a lifetime cancer risk of 10^{-6} or a hazard index value of 1.0 are presented in the attached Table 1. A comprehensive review of compounds that should be added to the site monitoring program is indicated.

Section 3.3.2.2 Downgradient Plume Monitoring

Seepage Face Receptor Monitoring

Point of compliance (POC) wells, identified in the OMP to monitor the seepage face receptor, are GH-04A/B, GH-05A, GH-07A, GH-08B, GH-09A/B, and GH-50A/B. Rationale for excluding monitoring well GH-05A was not included in the report. CRA summarizes that none of the

²Michigan Environmental Response Act, 1982 PA 307, as amended.

detected values exceed the Generic Groundwater to Surface Water Interface Criteria (GSI). The report failed to state that all monitoring locations, except GH-08A, exceed the SOW cleanup standard for arsenic (0.02 micrograms per liter [ug/L]).

Sentry wells located upgradient of the seepage face POC wells include GH-03A/B, GH-06A/B, GH-34A/B, GH-43A/B, and GH-44A. CRA summarizes that all wells were below GSI for metals and GH-43B reported detections of cis-1,2-dichloroethene (4.6 ug/L) and vinyl chloride (8.6 ug/L), also below GSI. The report failed to state that all sentry wells exceed the SOW cleanup standard for arsenic, except GH-43A, and monitoring well GH-43B also exceeds the SOW cleanup standards for cis-1,2-dichloroethene (1.0 ug/L) and vinyl chloride (1.0 ug/L). These omissions should be corrected in the report.

Downgradient Wetlands Receptor Monitoring

The POC wells monitored for downgradient wetlands receptors included GH-01A, GH-02A, GH-03A, and GH-34A. CRA summarizes that all wells were below GSI for metals, except for one detection of zinc at GH-02A, and that cyanide was detected at GH-34A above GSI and appears to be an anomaly. The cyanide detected at GH-34A as an anomaly is not supported by the data set because GH-34A has only been monitored for cyanide one other time in the past 8 years; there is not enough data available to draw this conclusion. Additionally, the report does not include that all POC wells exceed the SOW cleanup standard for arsenic. This erroneous conclusion and a more accurate assessment should be presented in the report.

Annual Water Quality Monitoring Wells

CRA is requesting to abandon monitoring well GH-16B and use data collected from GH-16A to represent conditions throughout the entire aquifer. Monitoring well GH-16A is screened in the shallow portion of the aquifer and GH-16B is screened in the lower portion of the aquifer. Data collected from GH-16A is not representative for monitoring both the shallow and deep areas of the aquifer. The MDEQ is willing to support abandonment of GH-16B as long as a new monitoring well is installed using vertical aquifer profiling to determine appropriate screen placement, the screen length does not exceed 5 feet in length, and the replacement well location is in close proximity to the original location of GH-16B. Monitoring well GH-16A should be repaired or replaced to restore the intended monitoring point.

CRA summarizes that GSI was exceeded at 3 monitoring locations for cyanide, 3 locations for zinc, and 1 location for nickel. However, this section of the report does not compare data to the SOW cleanup standards. SOW cleanup standards were exceeded at 12 locations for arsenic and 2 locations for lead. The report should acknowledge these exceedances.

5.0 Groundwater/Leachate Treatment Facility Monitoring

During an April 16, 2009, site visit, CRA staff indicated that the treatment system auto-dialer had been disabled because of repeated calls related to an ongoing, known maintenance problem. As soon as the maintenance issues are expeditiously resolved, the auto-dialer component of the treatment system needs to be returned to service.

5.1 Operation Summary

The operational summary should also include details relating to system downtimes experienced as a result of alarm conditions and noted maintenance problems.

6.0 Gas Probe Monitoring

The OMP does not specify method or equipment used to monitor the landfill gas probes. This section should include a brief summary of methods and equipment.

6.1 Perimeter Gas Probe Quality Monitoring

CRA indicates that GP-10 was not monitored during the June monitoring event but the report does not include an explanation for the inability to monitor.

6.2 Refuse Gas Probe Quality Monitoring

CRA includes monitoring probe GP-06 as a refuse gas monitoring point; however, GP-06 is located north of 23 Mile Road and not within the refuse. It is unclear why GP-06 is considered a refuse gas monitoring point.

7.0 Wetland Monitoring

CRA summarizes hydraulic monitoring of staff gauges located in wetlands 1 through 5. The OMP states that permanent water level gages and piezometers have been established for each wetland. However, it is unclear why wetland piezometers were not monitored during this event.

The OMP outlines an anticipated water level for each type of wetland during spring and later summer conditions. The following was determined from the monitoring data:

- The March 2008 monitoring event reported all wetlands to be dry with no standing water at the gauges. The OMP indicates spring water levels vary by wetland type between 4 feet (deep water wetland) above grade to 18 inches below grade (forest wetland).
- The June 2008 event reported dry conditions at wetland 1 and water present in the range of 1.25 to -0.5 feet at the remaining wetlands.
- CRA concludes that the wetlands are in good condition and well established even though the spring monitoring event reported dry conditions.

A vegetation evaluation was not completed during this monitoring period, as the OMP only indicated vegetation evaluation for the first five years. During a site visit on April 16, 2009, large areas of phragmites (common reeds or reed grass) were observed in the wetlands. Certain species of phragmites are documented to be an invasive species known to exist in Michigan. The invasive phragmites species are documented to reduce desirable wetland vegetation and consume standing water volumes.

Appendix A

Appendix A does not contain any bi-weekly or monthly inspection logs related to the containment system, site cap, wetlands, or general site features.

Additional Site Visit Observations

A very large tree was observed to have fallen onto and crushed the site fencing in the southwest corner of Phase III and an access point has been cut into the fence near the southeast corner of Phase I.

A liquid, orange and brown in color, was observed discharging from the 4-inch HDPE drain pipes along the western toe of Phase III. The discharge liquid consisted of flowing water with bacteria staining, sheens, discolorations, and some organic or leachate-type odors. The discharge was ponding on the ground surface north of the access road turn-around and flowing into the lower topography areas. Additional sampling of the discharge liquid was discussed with CRA to determine if the liquid contained landfill parameters and volatile organic compounds (VOC).

Observed recreational use of the Holland Ponds included fishing, bird watching, and hiking for adults, children, and pets. Access to the waters of the recreational area is not prohibited or limited in any manner. A sign exists at the trail head that indicates the waters of the recreational area are treatment discharge waters from the G&H Superfund Site.

Recommendations

Based on a review of the current and historic data available for the site and the operation, maintenance, and performance requirements of the SOW and OMP, the MDEQ has the following recommendations:

- Revise and resubmit the January – July 2008 report addressing comments identified in this letter;
- Prepare a corrective action plan, for the United States Environmental Protection Agency (USEPA) and MDEQ approval, to bring the source containment systems back into compliance with the SOW;
- Implement the approved corrective action plan to achieve hydraulic and physical containment of the source areas;
- Execute contingency plans to achieve the 2-feet inward gradient at the barrier wall and maintain water levels to allow the collection of NAPL from the Phase I and Phase II landfill cells as required in the SOW;
- Execute contingency plans to achieve hydraulic containment at the west end of the barrier wall and slurry wall as required in the SOW;
- Execute contingency plans to achieve hydraulic control around the DWSD watermain as required in the SOW;
- Evaluate the performance of the Phase III leachate collection system and execute contingency plans to achieve hydraulic containment at the Phase III landfill toe as required in the SOW;
- Expand the site groundwater cleanup standards list to include the 20 compounds identified as appropriate by the methods identified in the SOW;
- Revise appropriate report section to include comparison of monitoring data to the groundwater cleanup standards established in the SOW (including additional compounds identified to be added to the site cleanup standards list);
- Replace or repair monitoring well GH-16B;
- Evaluate species management to eliminate any invasive species within the wetlands;
- Inspect and repair the site fencing;
- Sample discharge liquids from the Phase III drain pipes to be analyzed for landfill parameters, VOCs, semi-VOCs, polychlorinated biphenyls, and metals; and
- Review acceptable recreational uses of the Holland Ponds and evaluate if the current uses are within an acceptable risk range and whether sufficient signage exists in keeping with the observed uses.

The MDEQ appreciates the opportunity to provide technical comments related to the operation, maintenance, and performance of the remedy implemented at the site. Additionally, the MDEQ is looking forward to assisting the USEPA in any manner possible during evaluation of these comments and communication of the comments to CRA.

If you have any questions regarding these comments please do not hesitate to contact me.

Sincerely,



Kristi Zakrzewski, P.E.

Project Manager

Specialized Sampling Unit

Superfund Section

Remediation and Redevelopment Division

517-373-2937

Attachments

cc: Ms. Daria W. Devantier, MDEQ
Ms. Barbara Vetort-Tiffany, MDEQ
G&H Landfill Site File – N1

Table 1: Summary of Groundwater Detections
June 23, 2008 Sampling Event
G&H Landfill Superfund Site, Utica, Michigan

Compound	Units	Federal MCLs ¹	Federal MCLGs	Michigan Act 307 Criteria ²	Concentration Range	No. of Detections/ No. of Samples	Exceeds 10 ⁻⁶ Lifetime Cancer Risk	Exceeds Hazard Index of 1.0
VOCs								
1,1-Dichloroethane	ug/l	--	--	700	0.34 - 0.43	2/60	no	no
1,2-Dichlorobenzene	ug/l	600	600	600	0.27 - 0.29	1/49	no	no
1,2-Dichloroethane	ug/l	5	0	0.4	0.38 - 0.38	1/49	yes	no
1,3-Dichlorobenzene	ug/l	--	--	600	0.77 - 0.82	1/49	no	no
1,4-Dichlorobenzene	ug/l	75	75	1	0.75 - 3.6	2/49	yes	no
2-Butanone (Methyl Ethyl Ketone)	ug/l	--	--	400	0.6 - 13	5/49	no	no
Benzene	ug/l	5	0	1	0.44 - 5.3	9/60	yes	no
Carbon disulfide	ug/l	--	--	700	0.29 - 0.29	1/49	no	no
Chlorobenzene	ug/l	100	100	100	0.21 - 2.1	14/49	no	no
Chloroethane	ug/l	--	--	9	0.32 - 2.1	8/49	no	no
cis-1,2-Dichloroethene	ug/l	70	70	70	0.23 - 4.6	9/60	no	no
Dichlorodifluoromethane (CFC-12)	ug/l	--	--	1,000	0.5 - 0.5	1/49	no	no
Methyl Tert Butyl Ether	ug/l	--	--	500	0.23 - 0.23	1/49	no	no
trans-1,2-Dichloroethene	ug/l	100	100	100	0.2 - 0.39	2/60	no	no
Vinyl chloride	ug/l	2	0	0.02	0.23 - 8.6	4/60	yes	no
SVOCs								
4-Methylphenol	ug/l	--	--	400	1.2 - 610	4/49	no	yes
bis(2-Chloroethyl)ether	ug/l	--	--	0.03	0.23 - 0.52	2/49	yes	no
bis(2-Ethylhexyl)phthalate	ug/l	6	0	2	1 - 28	2/49	yes	no
N-Nitrosodiphenylamine	ug/l	--	--	--	0.47 - 0.47	1/49	no	no
Phenol	ug/l	--	--	4,000	290 - 290	1/49	no	yes
Metals								
Aluminum	mg/L	0.05 - 0.2 s	--	0.05, 0.2 ³	0.0202 - 0.458	16/49	no	no
Antimony	mg/L	0.006	0.006	0.003	0.00014 - 0.00018	4/49	no	yes
Arsenic	mg/L	0.01	0	0.00002	0.0037 - 0.136	48/60	yes	yes
Barium	mg/L	2	2	2	0.0183 - 0.508	60/60	no	no
Chromium Total	mg/L	0.1	0.1	0.1	0.0024 - 0.0453	7/49	no	no
Cobalt	mg/L	--	--	--	0.0021 - 0.0127	10/49	no	no
Copper	mg/L	1 s	--	1	0.0003 - 0.0036	32/49	no	no
Iron	mg/L	0.3 s	--	0.3 ³	0.0845 - 40.1	46/49	no	yes
Lead	mg/L	0.015	0	--	0.0055 - 0.0112	3/60	no	no
Magnesium	mg/L	--	--	--	14 - 114	49/49	no	no
Manganese	mg/L	0.05 s	--	0.7, 0.05 ³	0.00089 - 1.61	49/49	no	yes
Nickel	mg/L	--	--	0.01	0.0038 - 0.12	13/49	no	yes
Selenium	mg/L	0.05	0.05	0.04	0.007 - 0.007	1/49	no	no
Sodium	mg/L	--	--	150	9.81 - 369	49/49	no	yes
Thallium	mg/L	0.002	0.0005	0.0005	0.00017 - 0.00034	7/49	no	yes
Vanadium	mg/L	--	--	--	0.00076 - 0.0022	9/49	no	no
Zinc	mg/L	5 s	--	1, 5 ³	0.0592 - 4.52	9/49	no	yes
PCBs								
Aroclor-1254 (PCB-1254)	ug/l	0.0005	0	0.02	0.075 - 0.075	1/49	yes	yes
Pesticides								
alpha-BHC	ug/l	--	--	0.006	0.0086 - 0.02	3/49	yes	no
beta-BHC	ug/l	--	--	0.02	0.014 - 0.28	28/49	yes	no
delta-BHC	ug/l	--	--	--	0.026 - 0.19	4/49	yes	no
General Chemistry								
Alkalinity, Total (as CaCO3)	mg/L	--	--	--	140 - 1400	49/49	no	no
Cyanide (total)	mg/L	0.2	0.2	0.1	0.0052 - 0.37	9/49	no	yes
Sulfate	mg/L	250 s	--	250 ³	0.2 - 346	49/49	no	no

Notes:

¹ U.S. EPA, 2003. List of Contaminants and their MCLs. EPA816-F-02-013, June.

² MERA Operational Memorandum #8, Revision 1 -- Type B Criteria Rules 299.5709, 299.5711(2), 299.5711(5) and 299.5713

³ Aesthetic Drinking Water Value

s = Secondary MCL

-- = Not Available

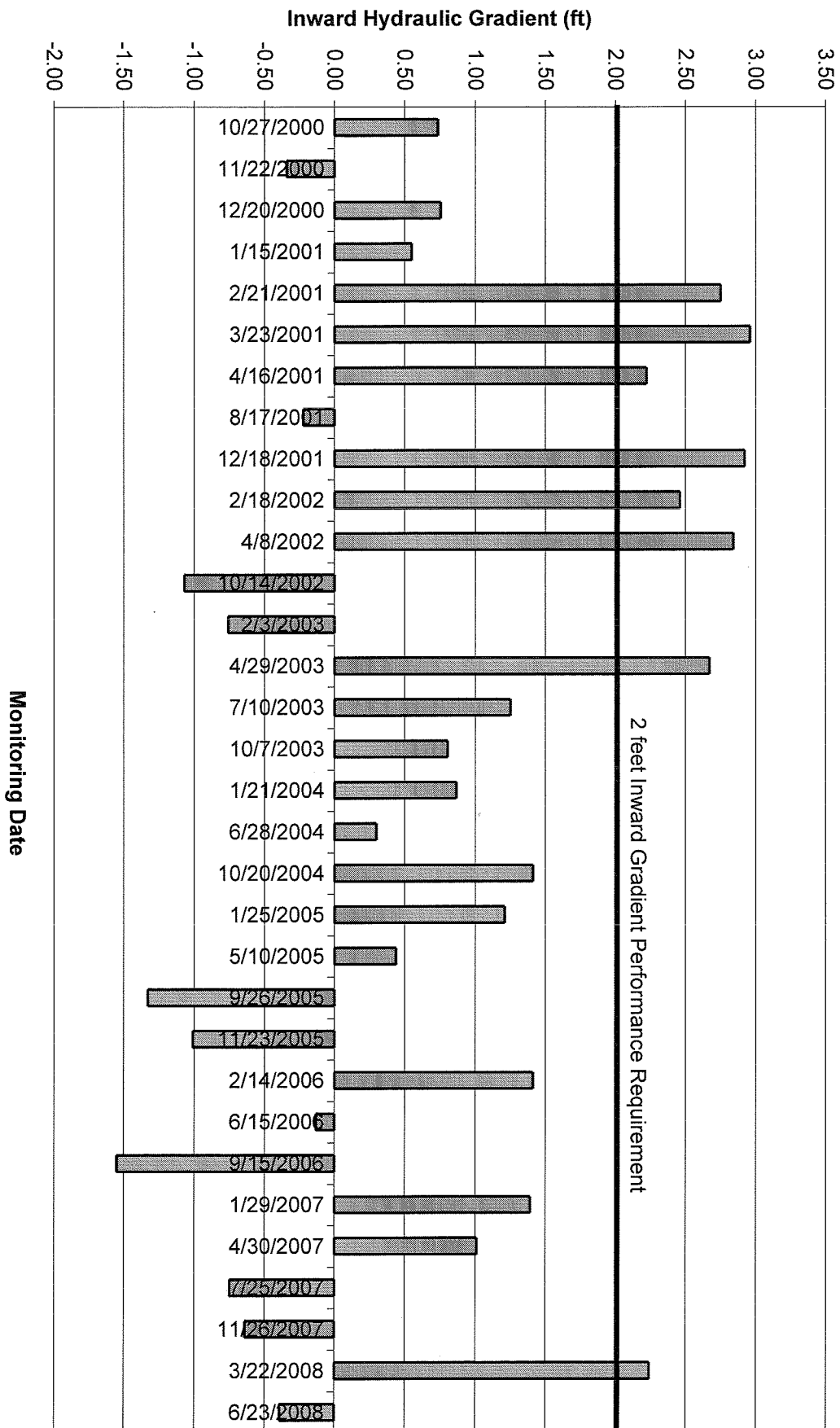
Exceeds federal and/or state criteria =

ATTACHMENT A

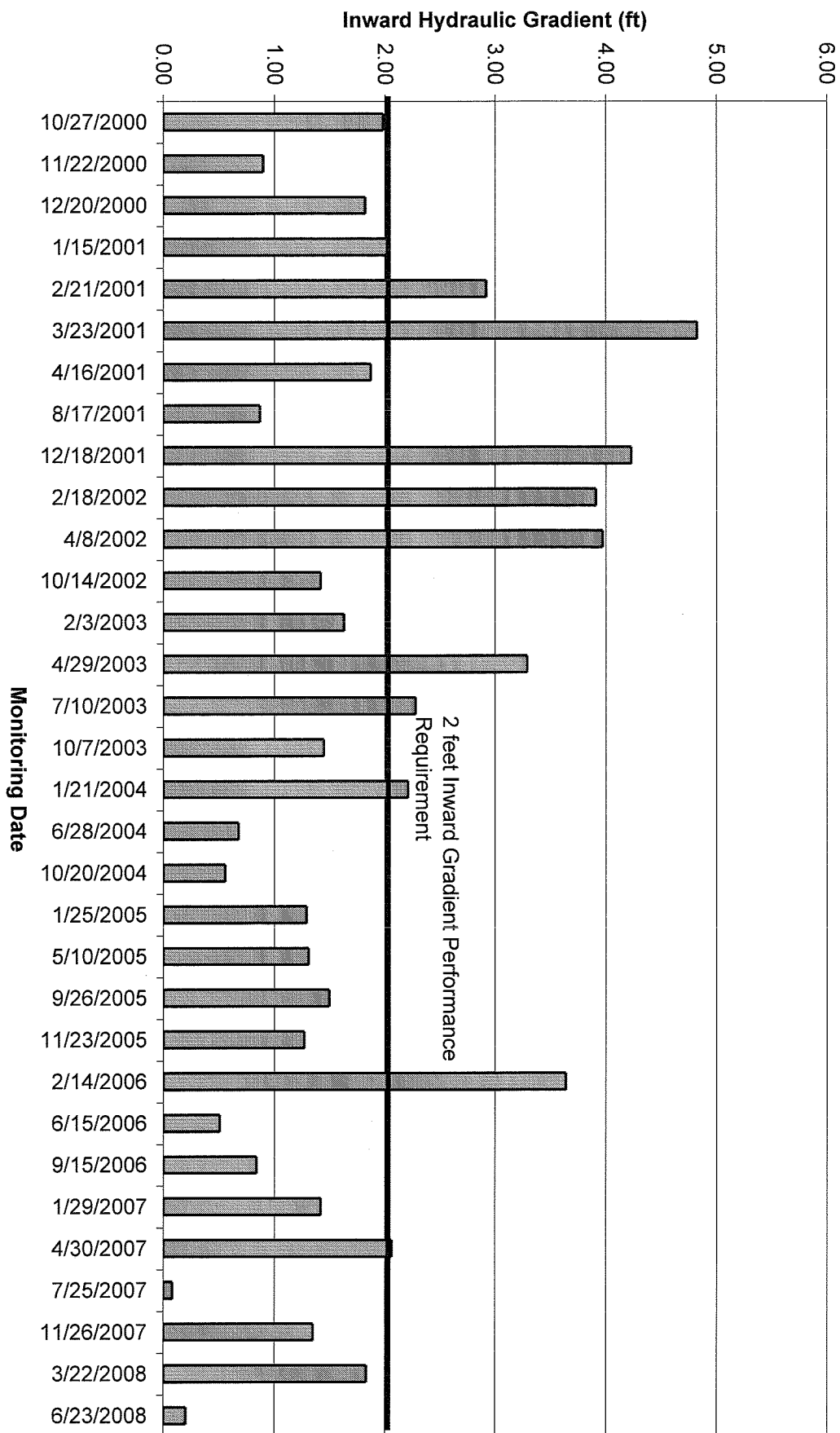
Slurry Wall Inward Gradient Summary per Monitoring Well Pair

Charts 1 through 8

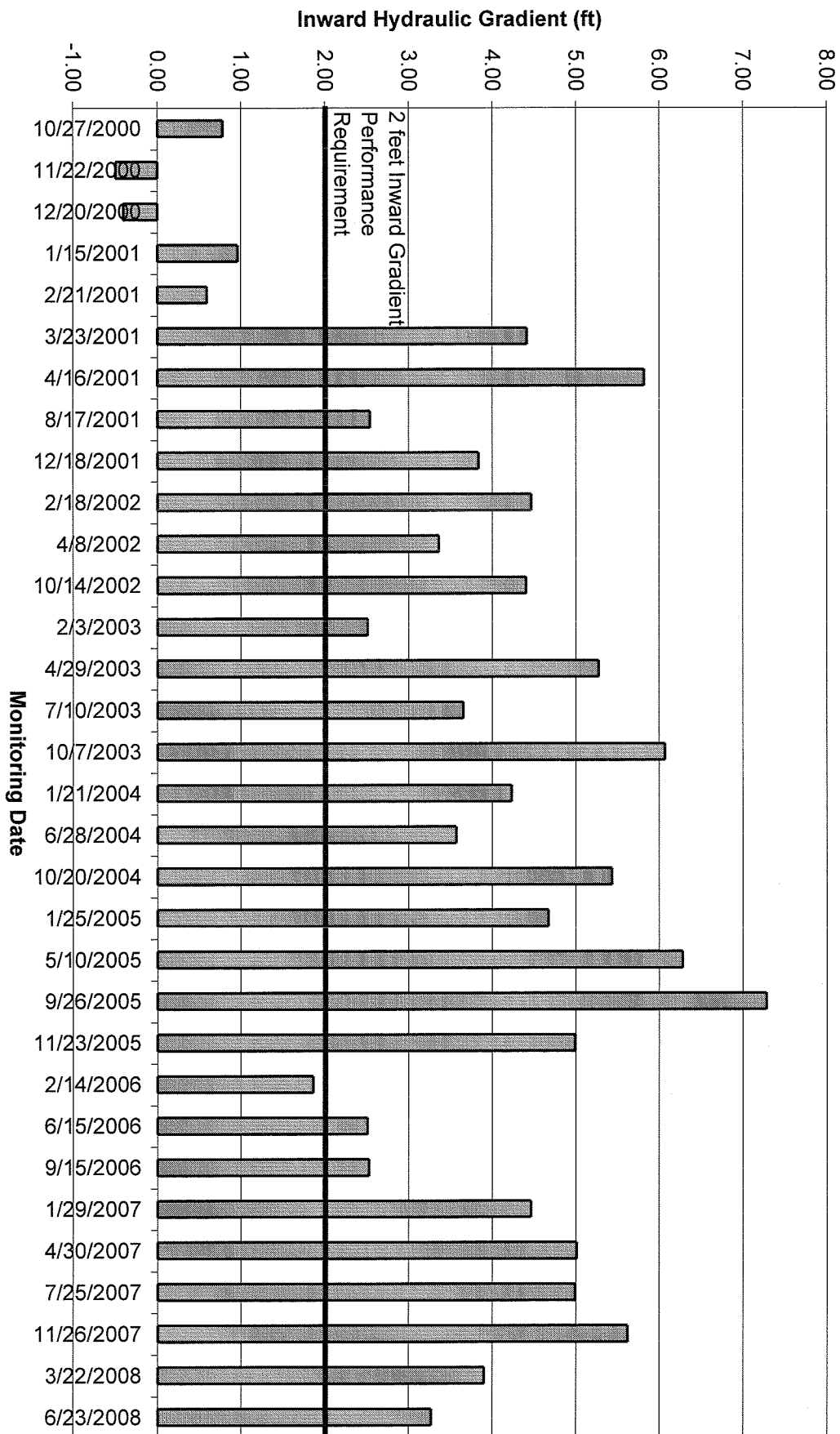
**Chart 1: Slurry Wall Inward Gradient Summary at GH-52/GH-53
G&H Landfill Superfund Site, Utica, MI**



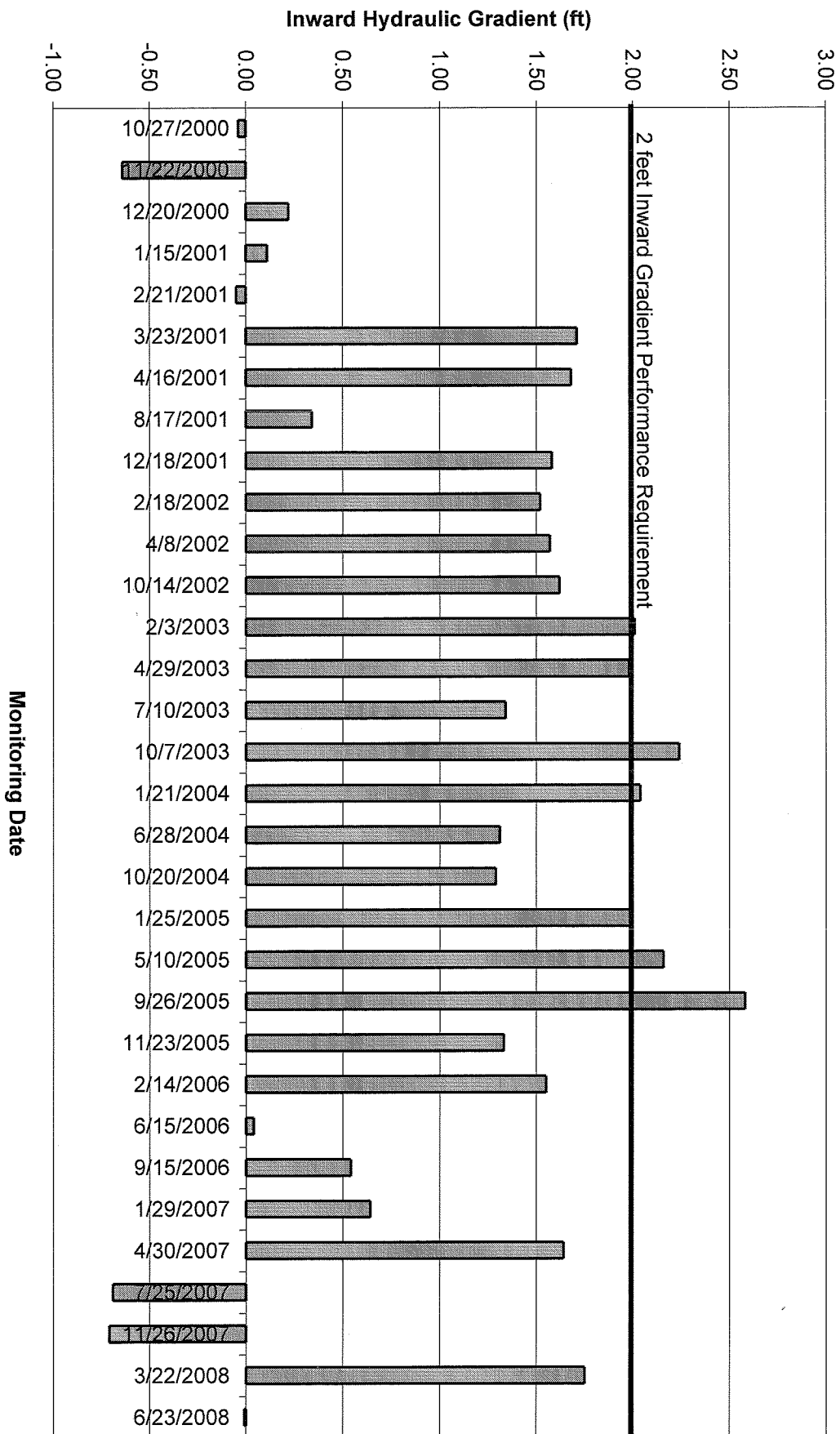
**Chart 2: Slurry Wall Inward Gradient Summary at GH-54/GH-55
G&H Landfill Superfund Site, Utica, MI**



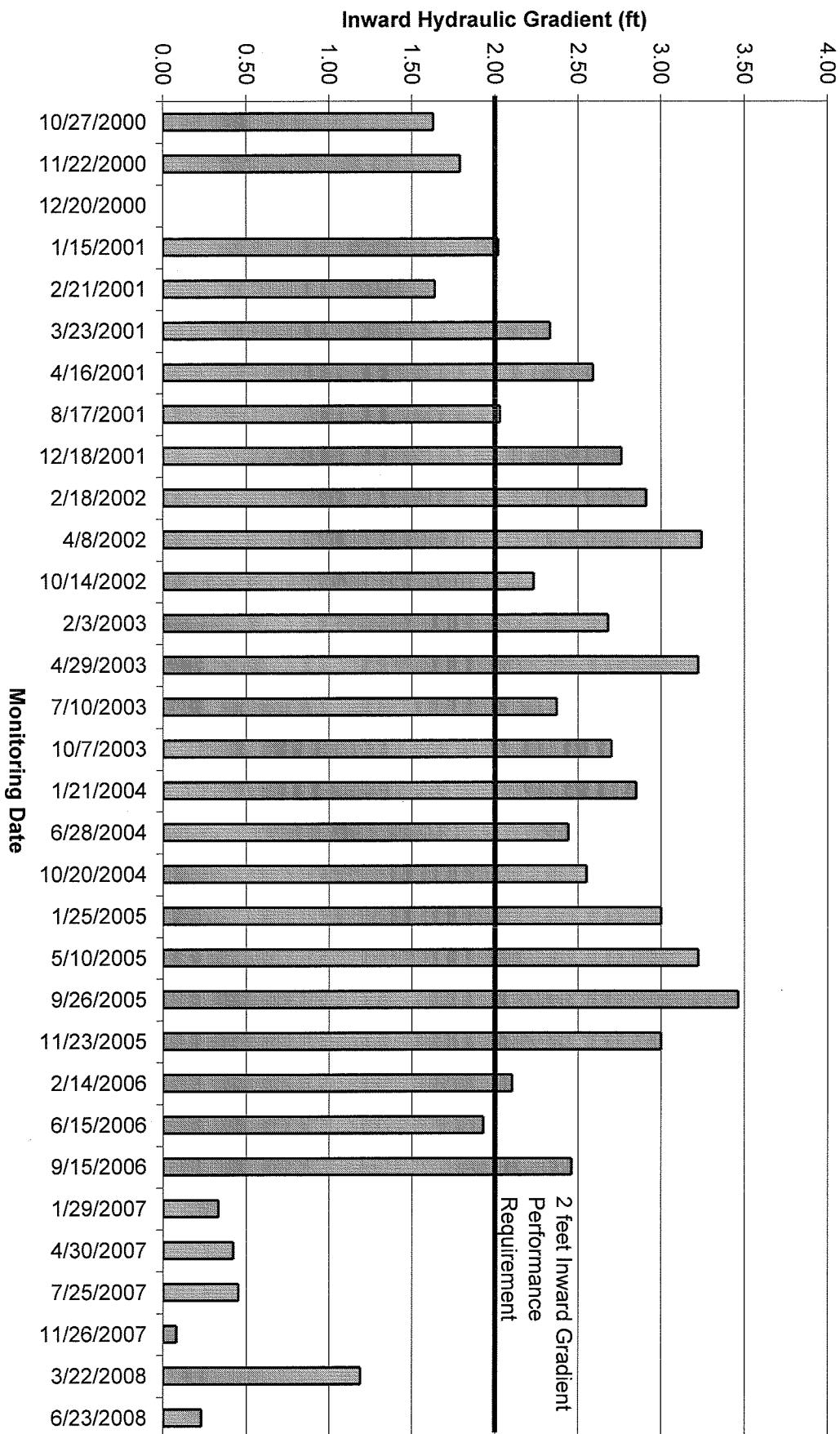
**Chart 3: Slurry Wall Inward Gradient Summary at GH-56/GH-57
G&H Landfill Superfund Site, Utica, MI**



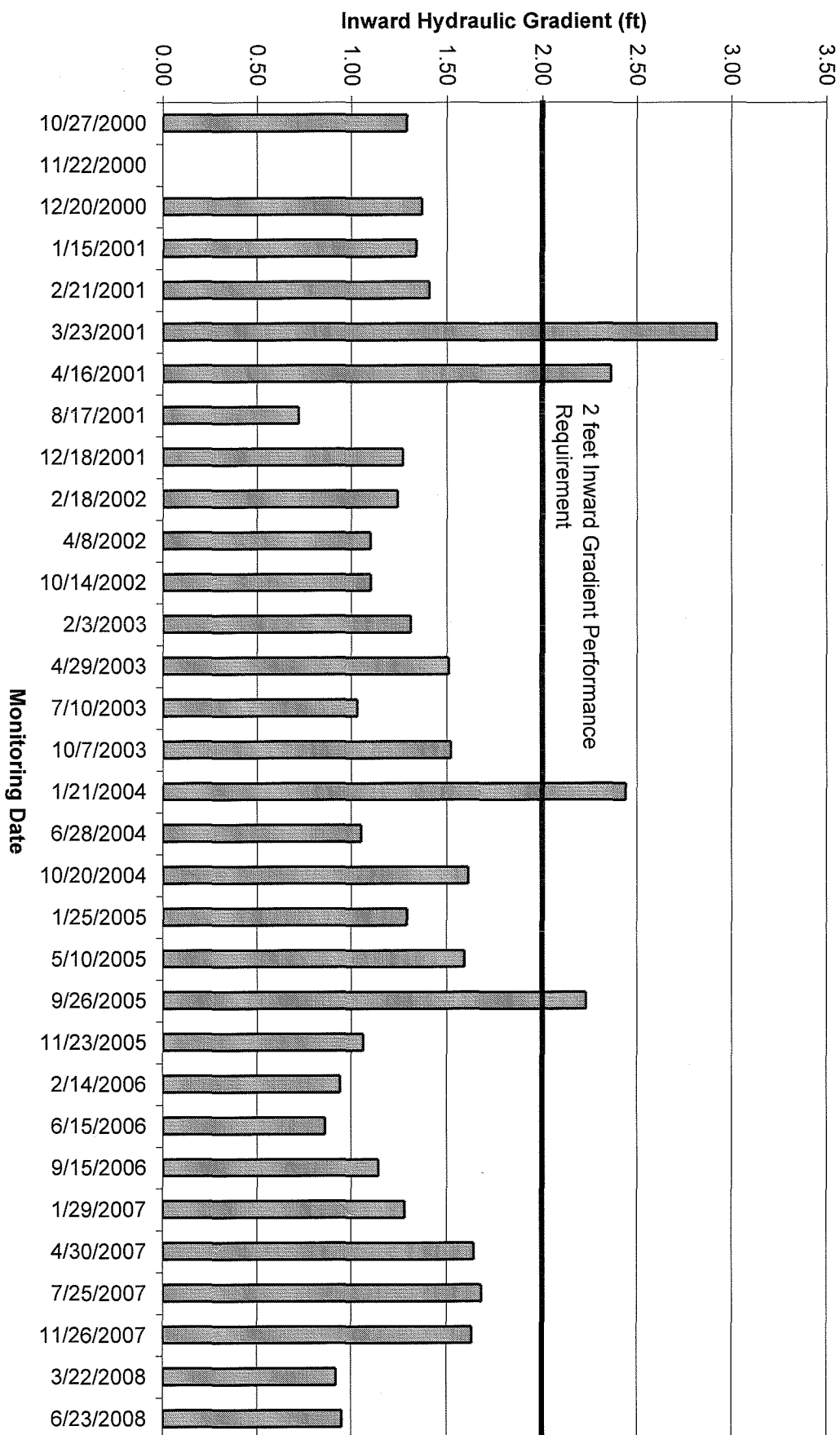
**Chart 4: Slurry Wall Inward Gradient Summary at GH-58/GH-59
G&H Landfill Superfund Site, Utica, MI**



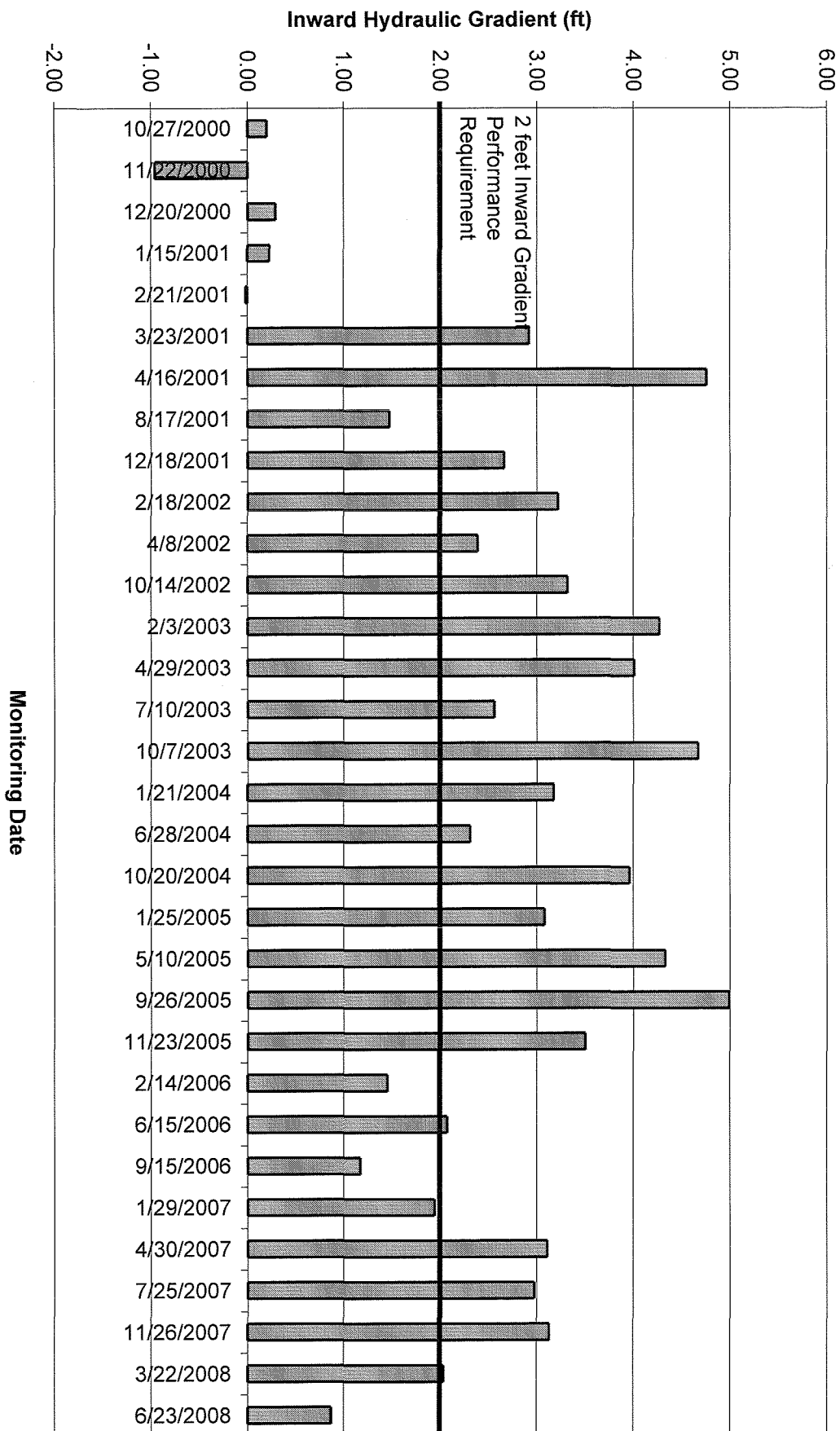
**Chart 5: Slurry Wall Inward Gradient Summary at GH-60/GH-61
G&H Landfill Superfund Site, Utica, MI**



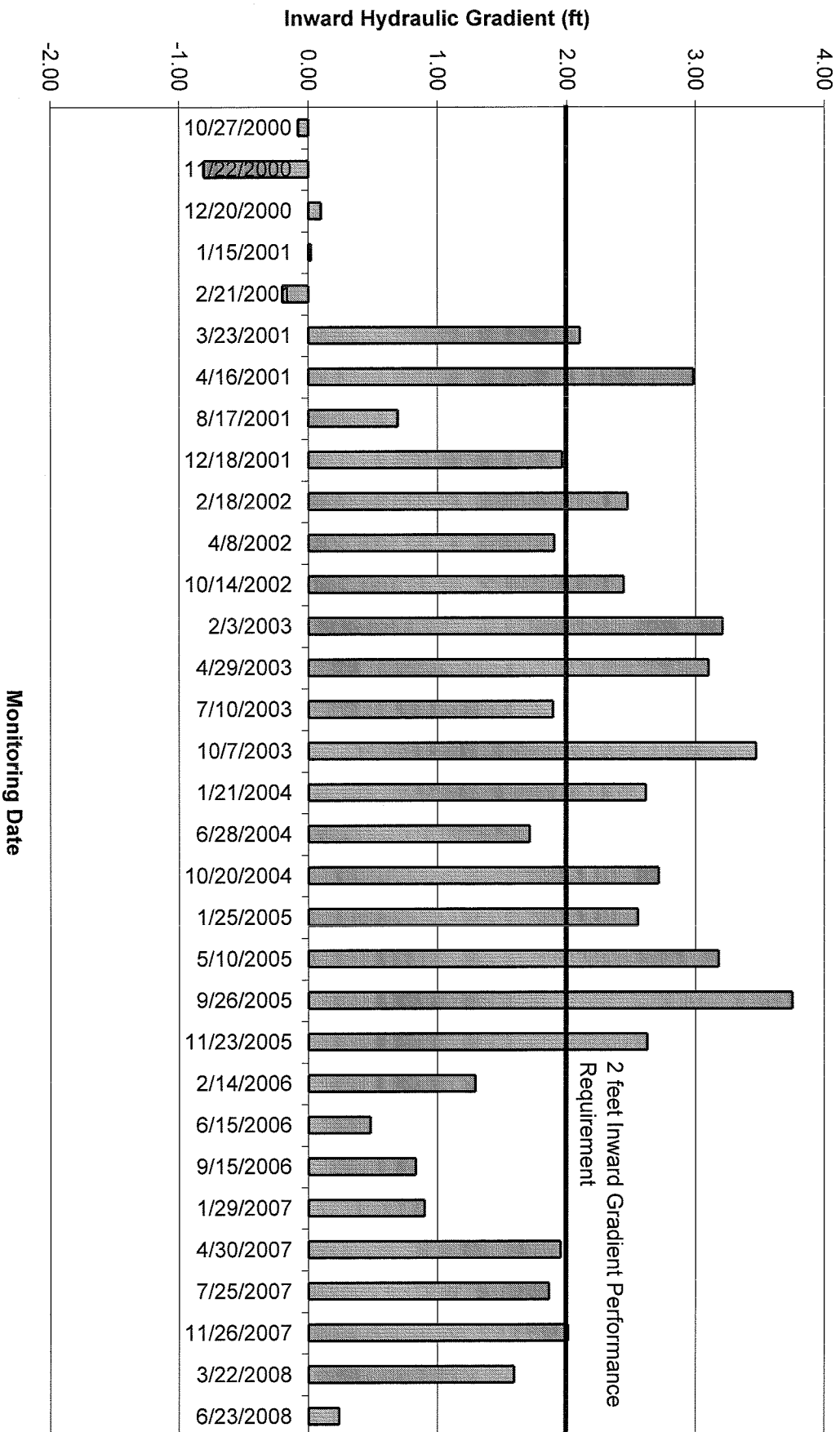
**Chart 6: Slurry Wall Inward Gradient Summary at GH-78/GH-79
G&H Landfill Superfund Site, Utica, MI**



**Chart 7: Slurry Wall Inward Gradient Summary at GH-80/GH-81
G&H Landfill Superfund Site, Utica, MI**



**Chart 8: Slurry Wall Inward Gradient Summary at GH-82/GH-83
G&H Landfill Superfund Site, Utica, MI**



ATTACHMENT B

Leachate Elevations Inside Slurry Wall, at DWSD
Watermain, and at Phase III Toe Drain

Charts 9 - 19

**Chart 9: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-52**

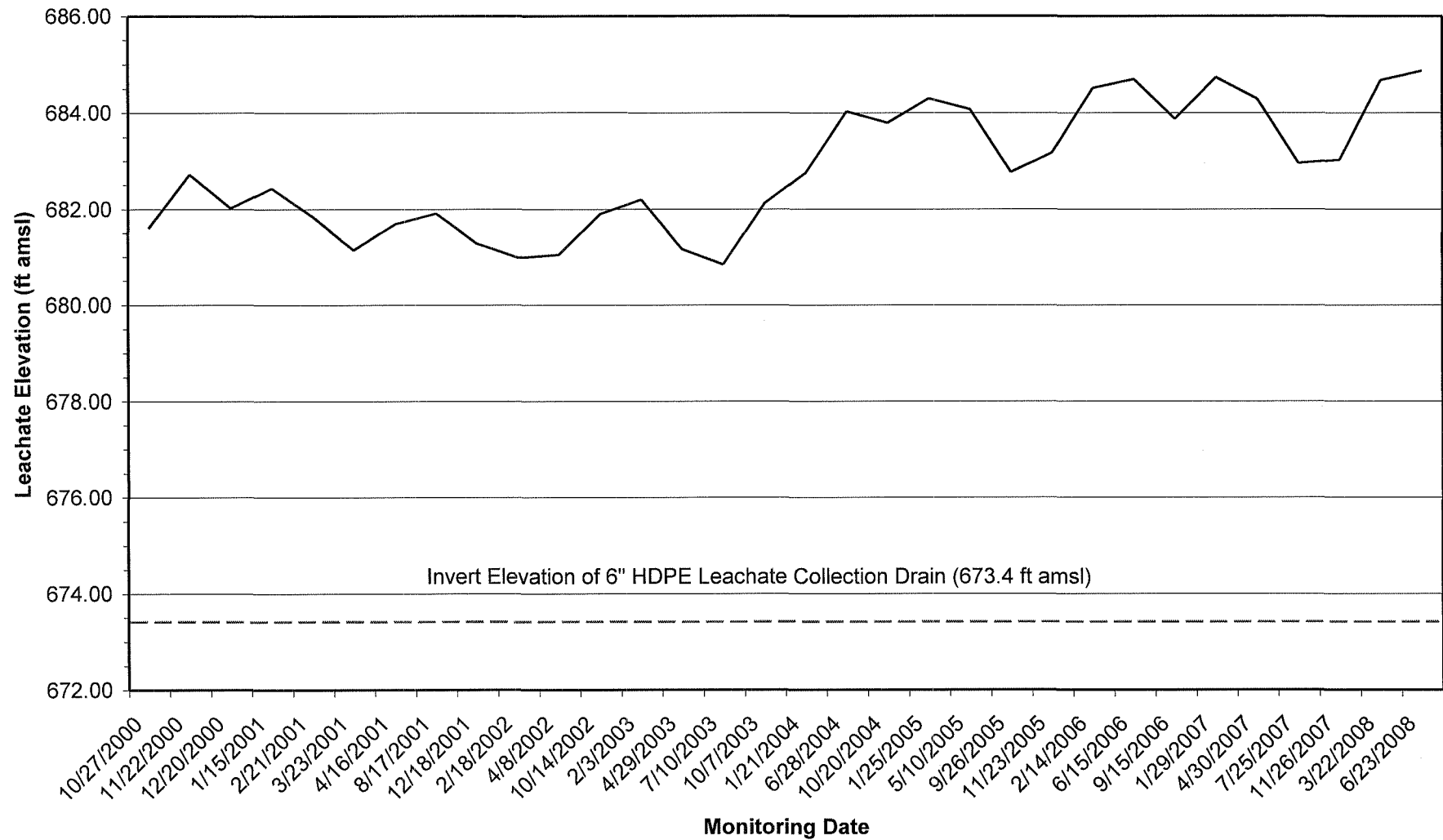


Chart 10: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-54

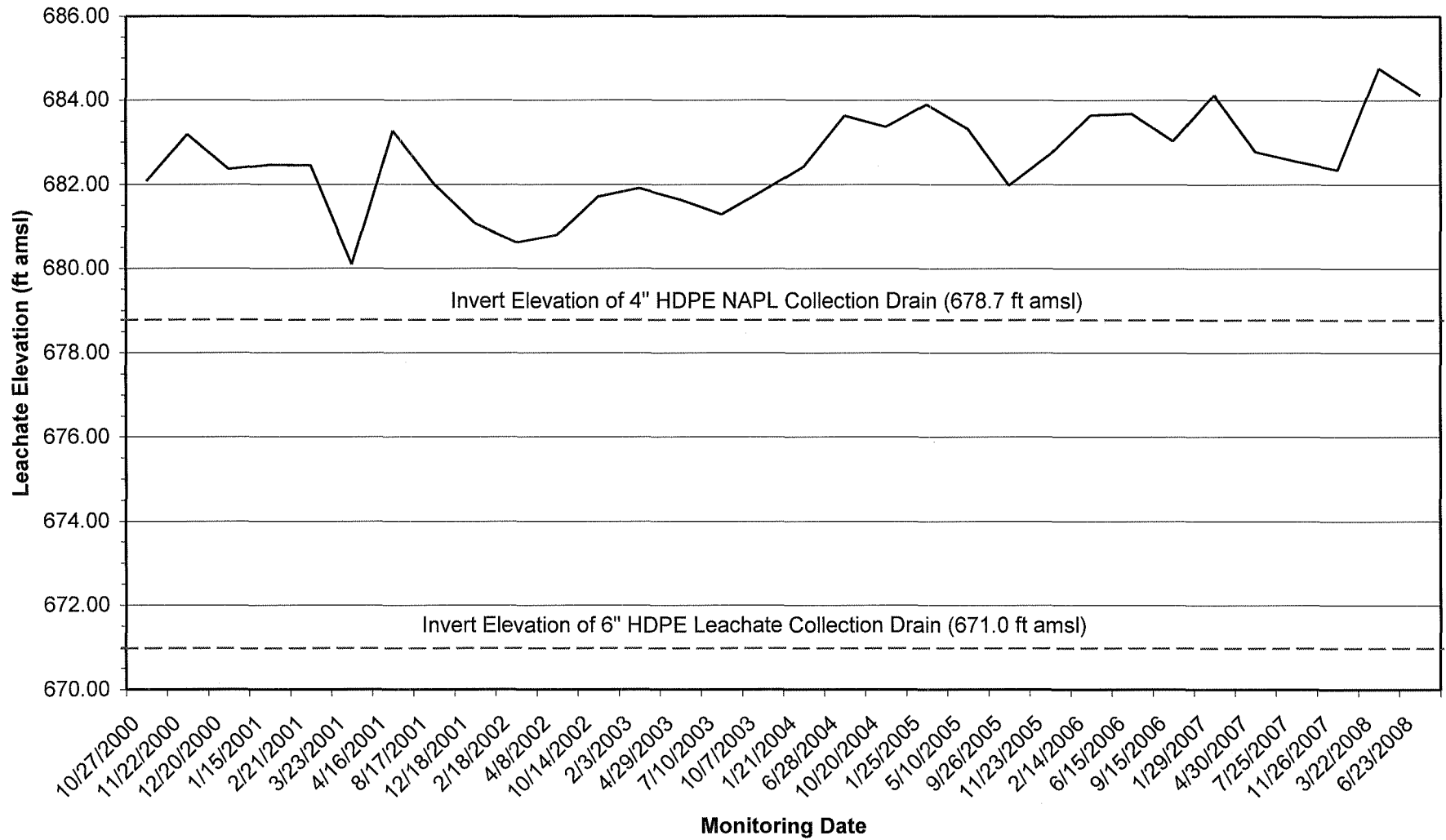


Chart 11: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-56

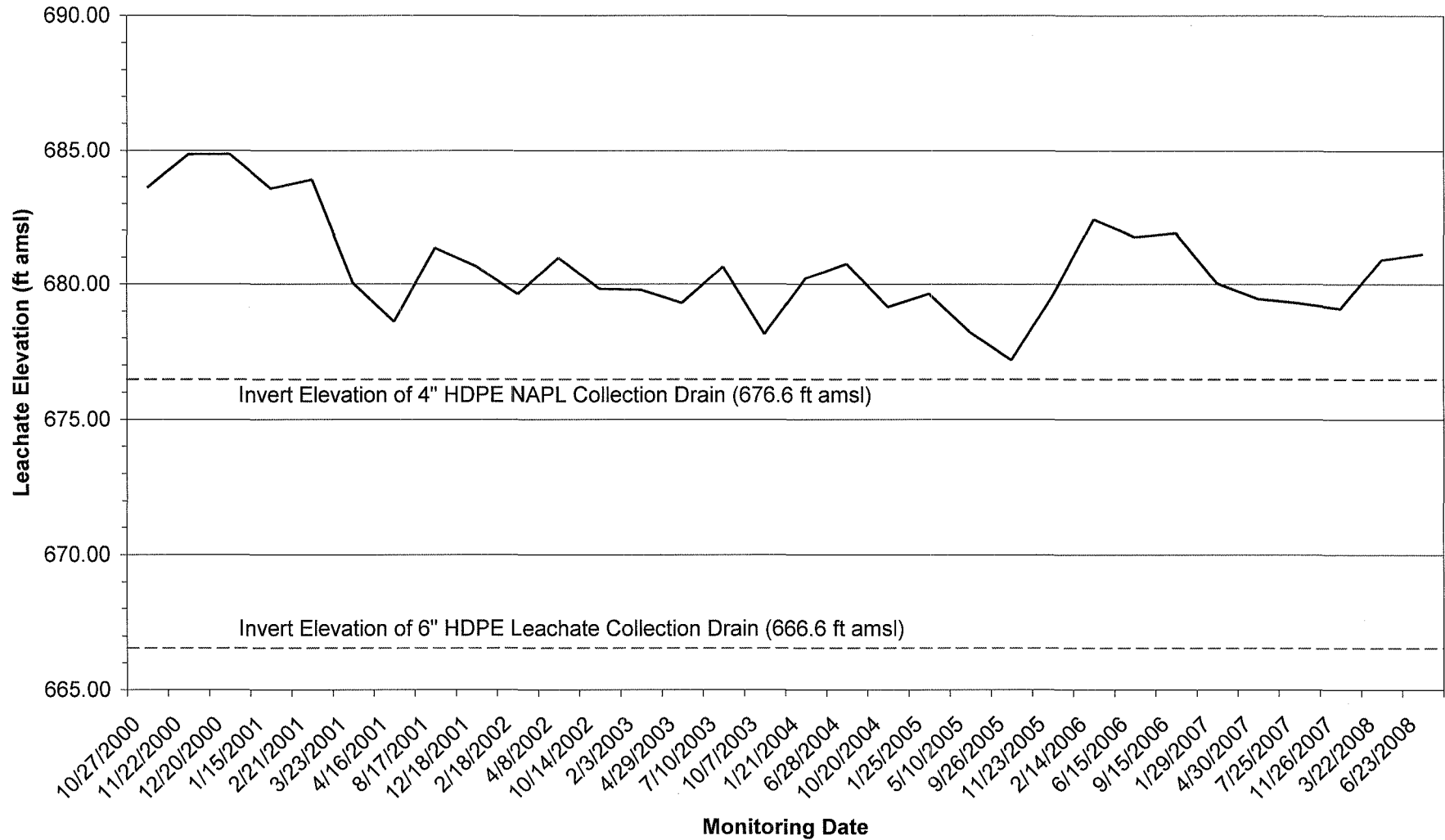
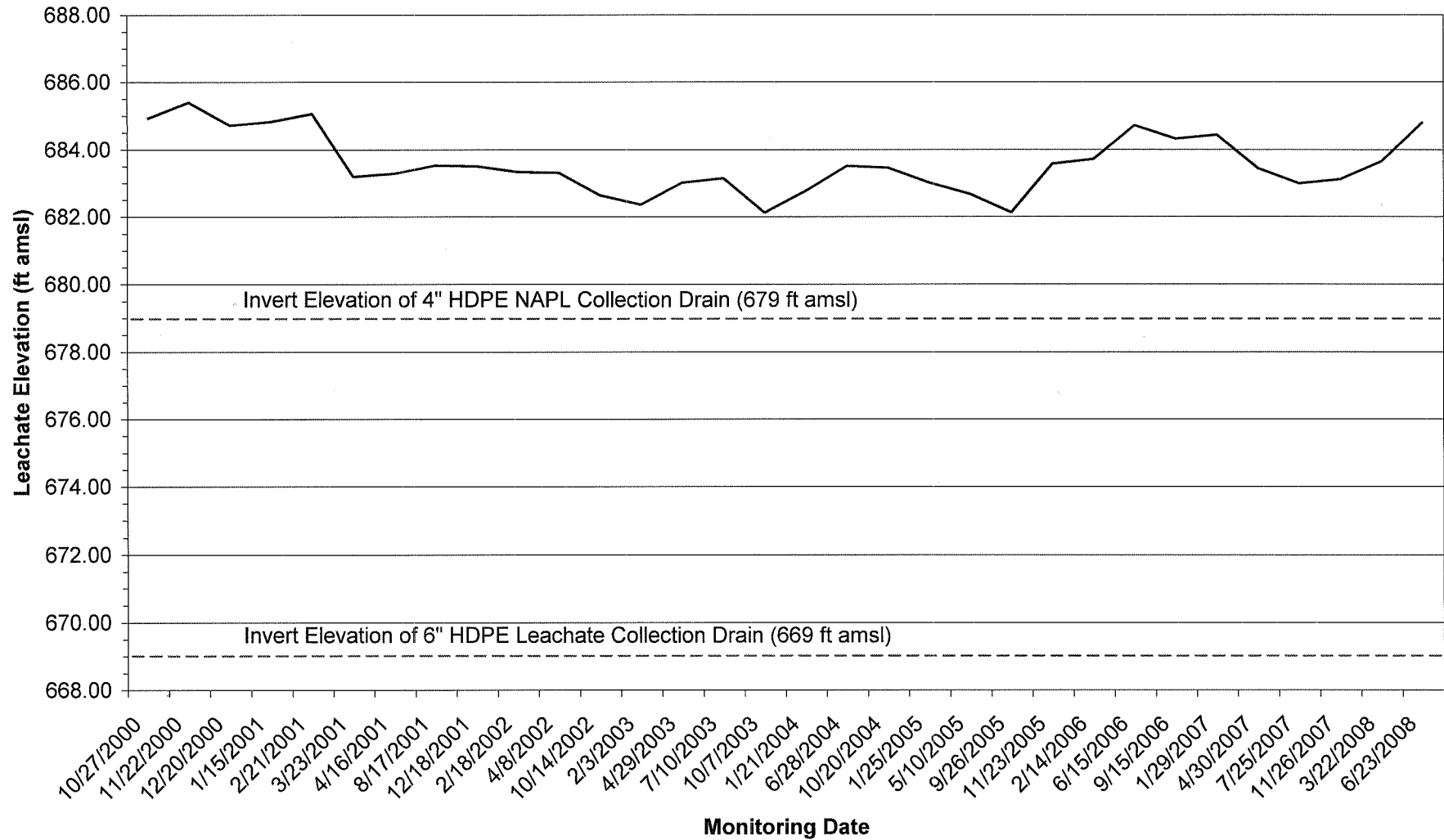


Chart 12: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-58



**Chart 13: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-60**

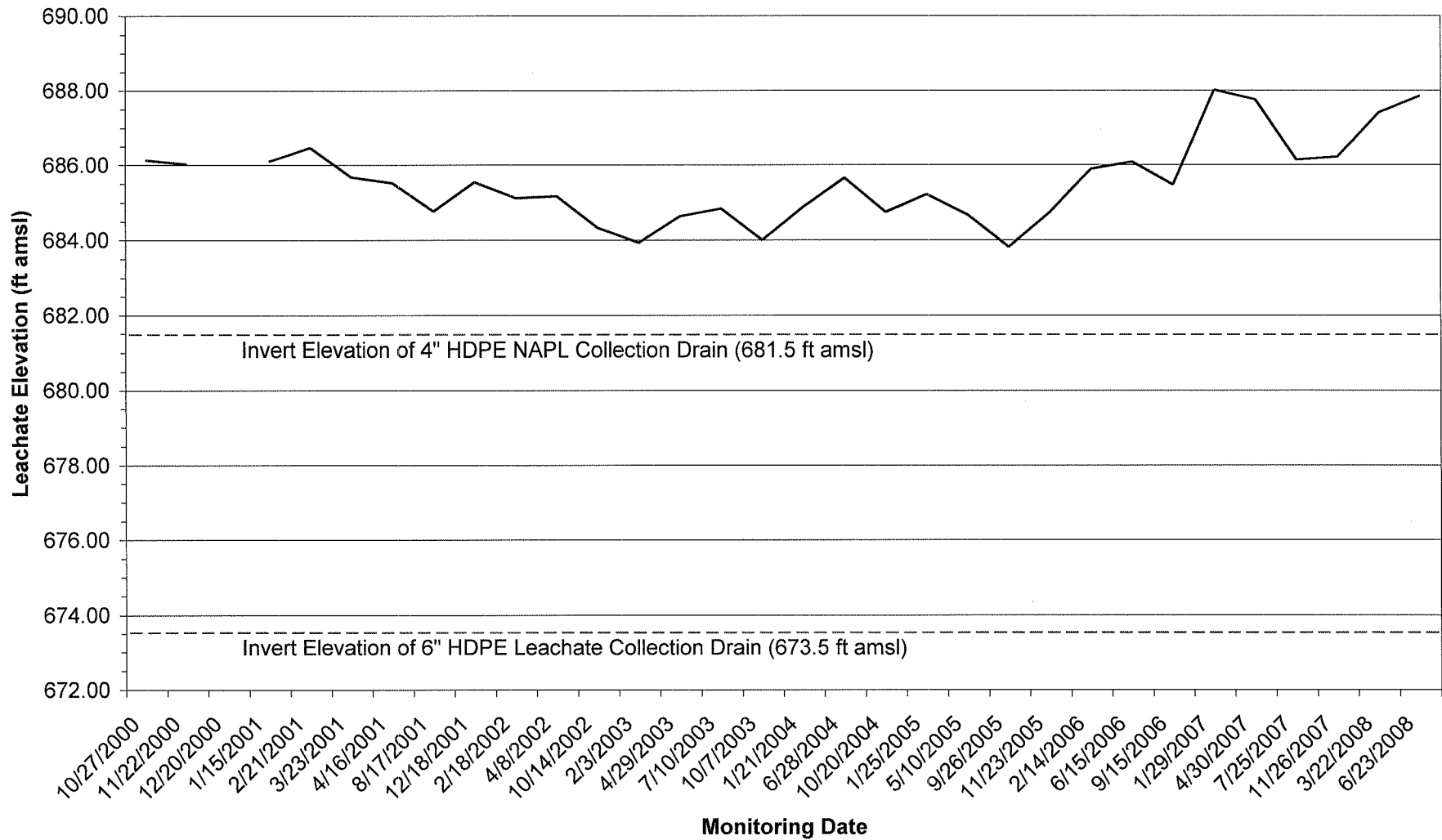


Chart 14: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-78

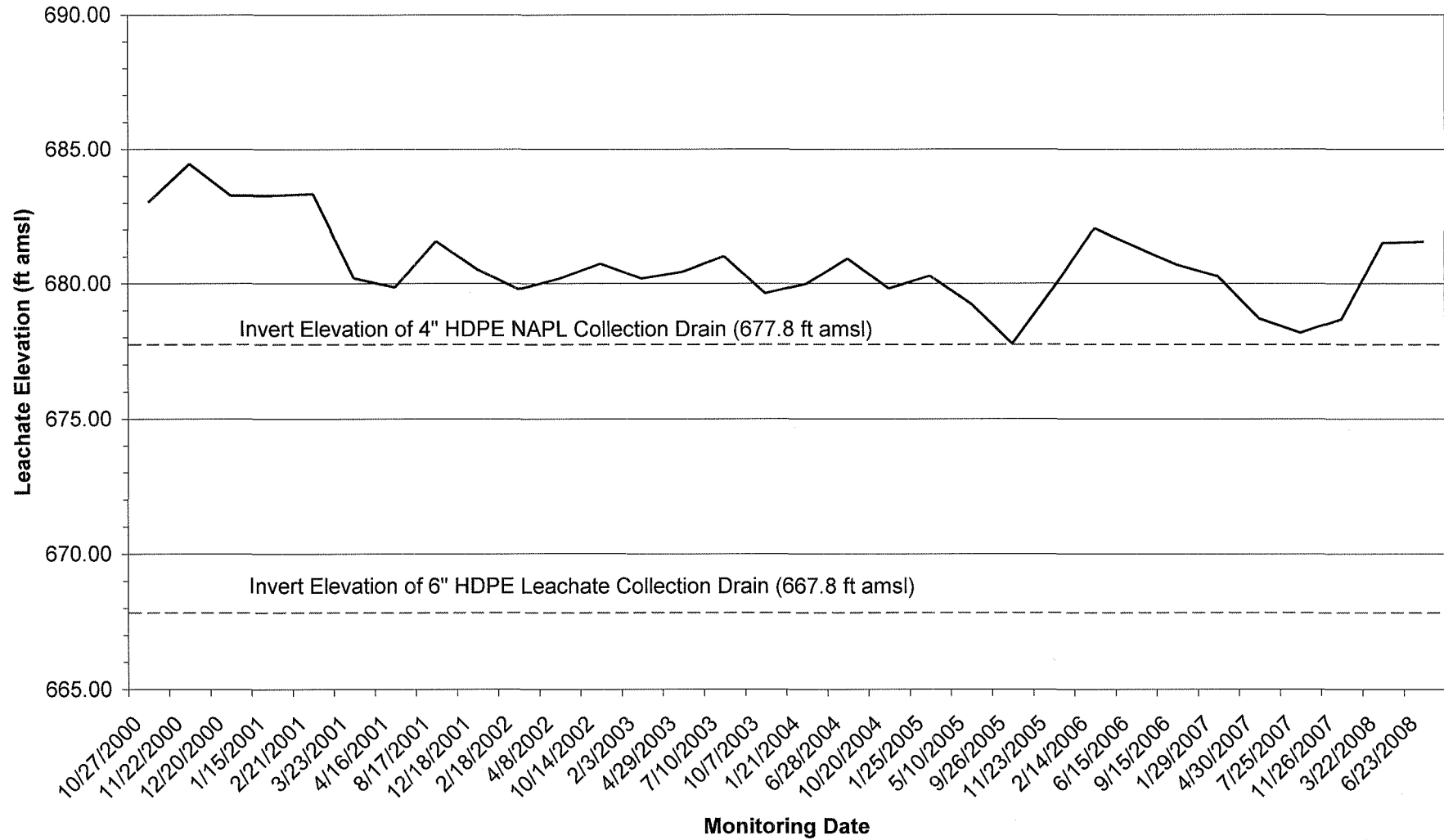


Chart 15: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-80

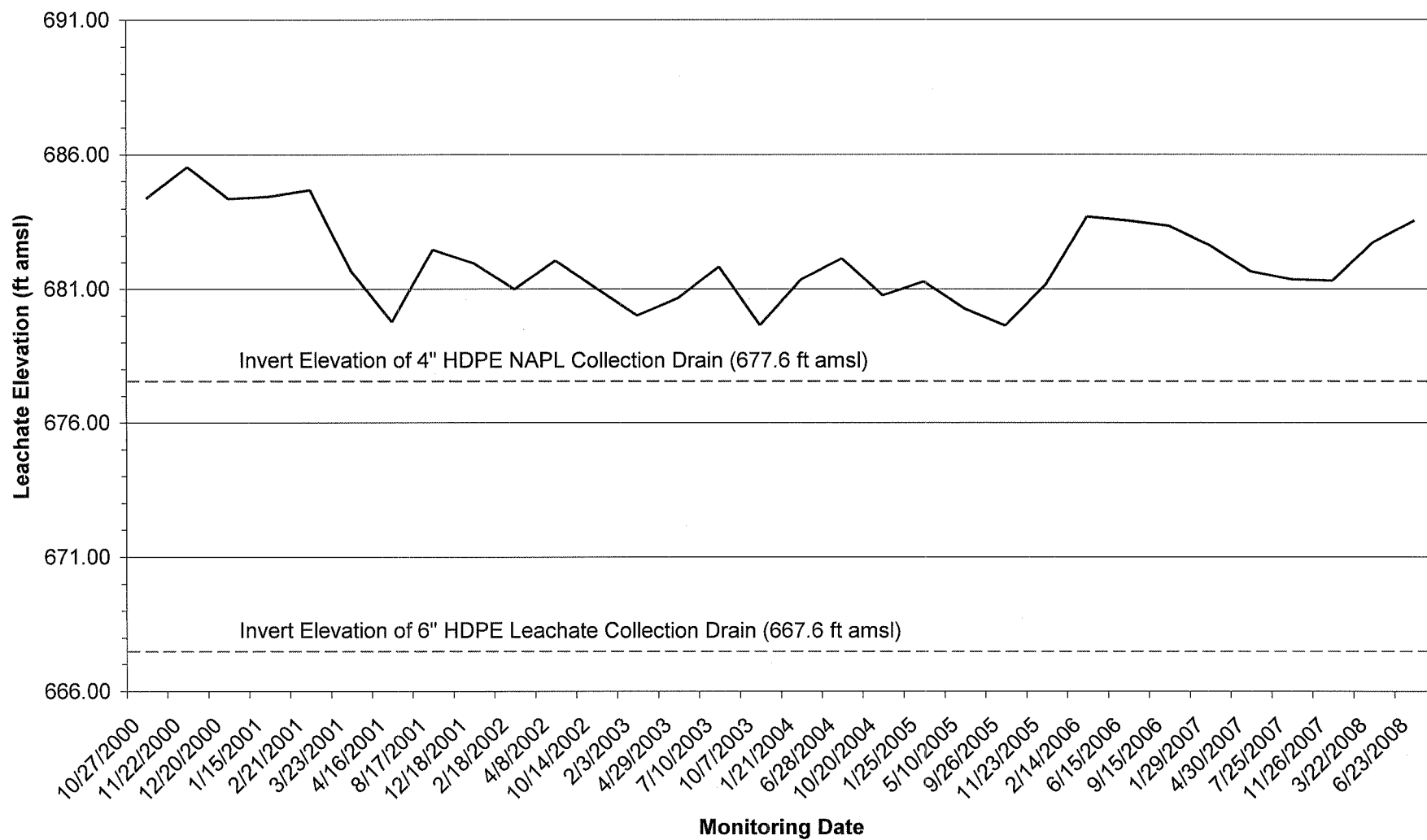
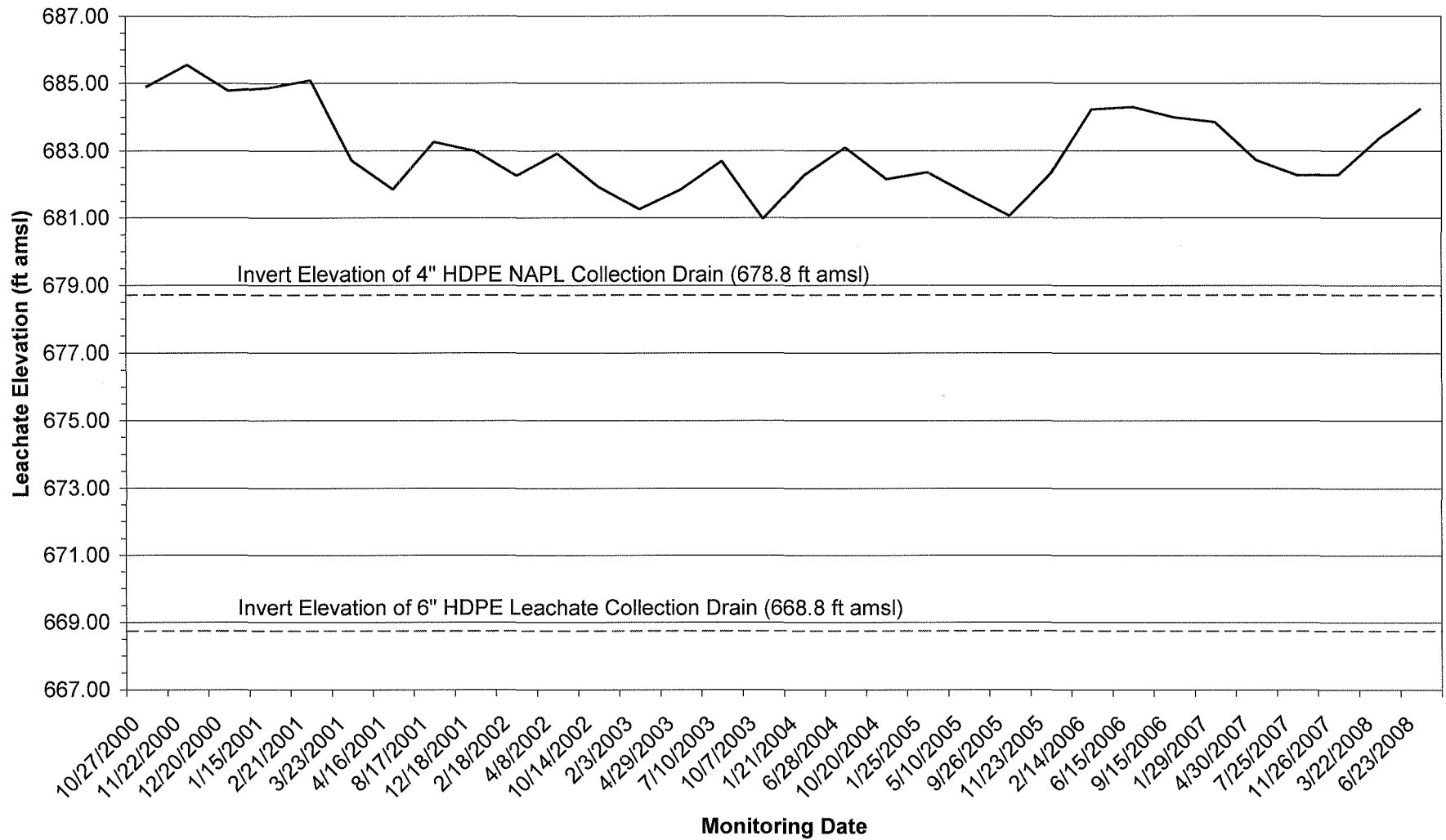


Chart 16: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Inside Slurry Wall at GH-82



**Chart 17: Groundwater Elevations at DWSD Watermain
G&H Landfill Superfund Site, Utica, MI**

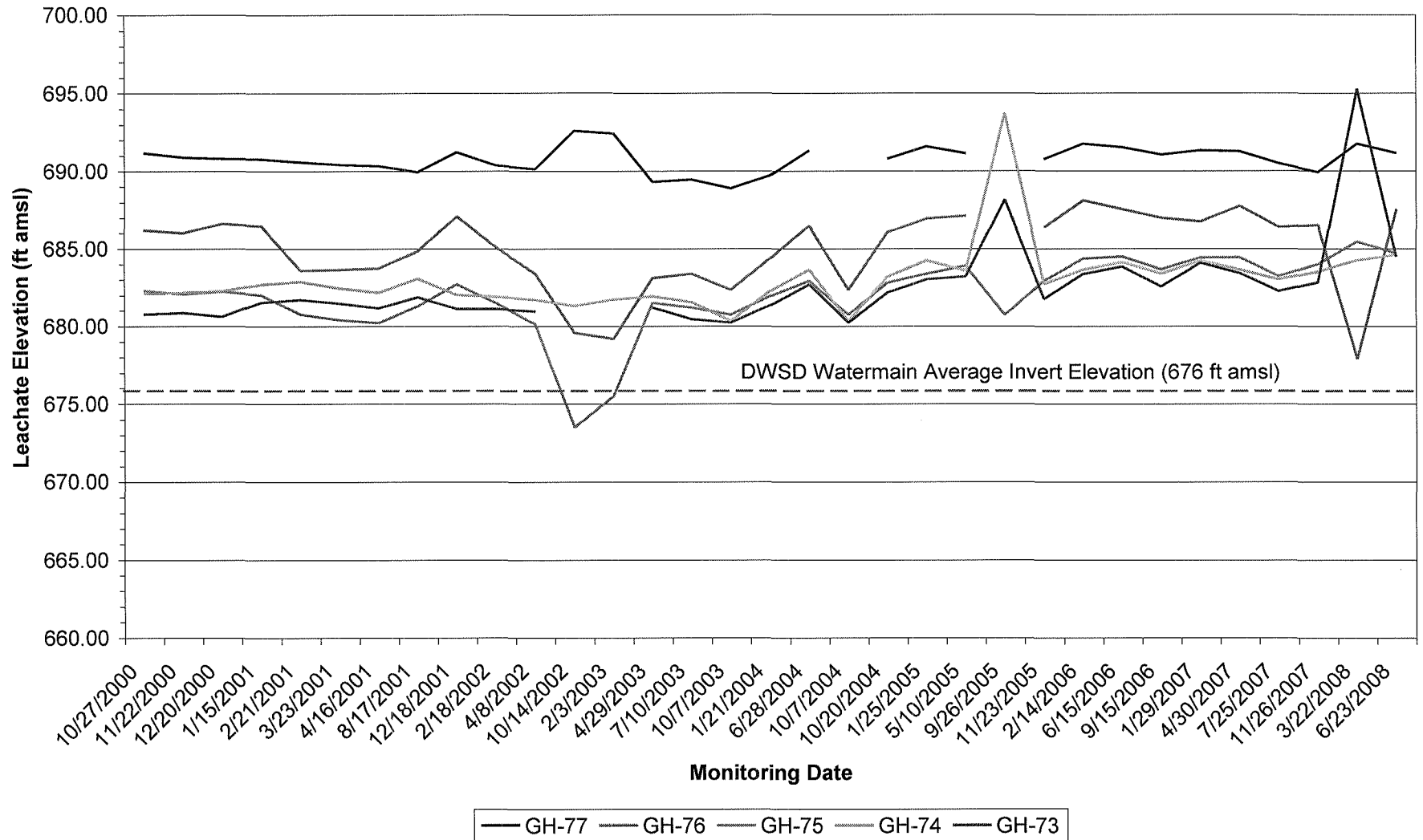
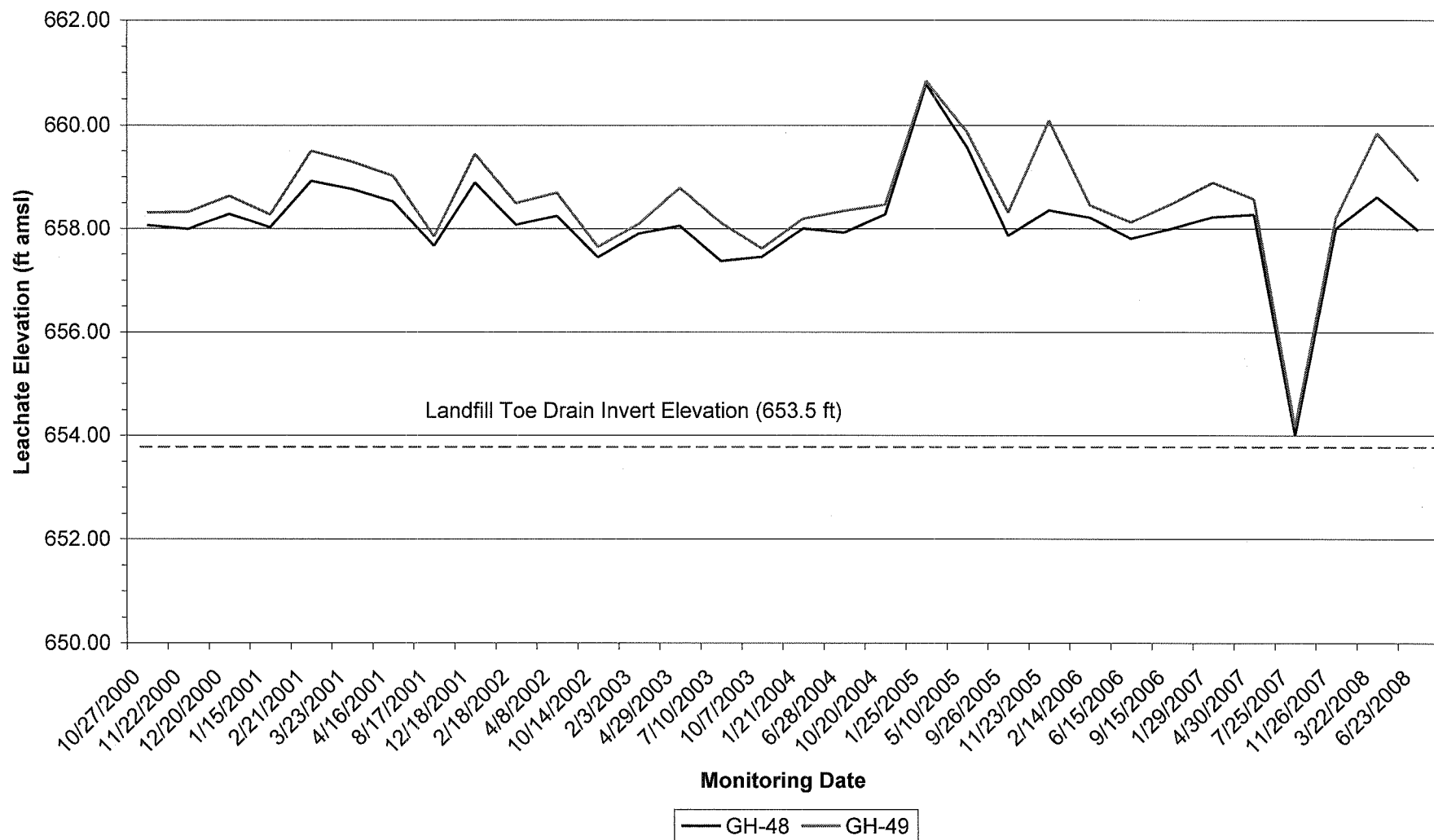


Chart 18: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Phase III Toe Drain at GH-48 and GH-49



**Chart 19: G&H Landfill Superfund Site, Utica, MI
Leachate Elevation Phase III Toe Drain at GW-10**

